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NOTES ON GEOGRAPHIC DISTRIBUTION

Discovery of the ant parasitoid wasp genus *Saccharissa* Kirby, 1886 (Hymenoptera, Eucharitidae) from Japan

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Abstract. The ant parasitoid wasp genus *Saccharissa* Kirby, 1886 (Hymenoptera: Eucharitidae) is recorded in Japan for the first time based on *S. vicina* (Masi, 1926), and the body size and distribution of this species are briefly discussed.

Key words. Distribution, myrmecophily, new record, Oriental region, parasitoid wasp, *Saccharissa vicina*

Hisasue Y (2025) Discovery of the ant parasitoid wasp genus *Saccharissa* Kirby, 1886 (Hymenoptera, Eucharitidae) from Japan. Check List 21 (2): 312–317. https://doi.org/10.15560/21.2.312

INTRODUCTION

The family Eucharitidae comprises small to medium-sized parasitoid wasps belonging to the superfamily Chalcidoidea, with all species parasitizing ant larvae (Heraty, 2002; Lachaud and Pérez-Lachaud 2012). This family consists of approximately 60 genera and 500 species worldwide (Heraty 2002, 2019). The life cycle of the Eucharitidae is highly specialized; females lay eggs on plants traversed by their host ants. Hatched larvae, or planidia, attach to foraging worker ants and are transported into the nests. Inside the nest, eucharitid larvae transfer onto ant larvae, where they remain dormant until the host pupates, after which they begin feeding (Clausen 1940; Heraty 1994, 2002; Baker et al. 2020). After consuming the host, the larvae pupate within the ant cocoon. After emergence, they acquire the cuticular hydrocarbons of the host ants (Van der Meer et al. 1989) or use chemical mimicry (Pérez-Lachaud et al. 2015) to escape the nest undetected.

The genus *Saccharissa* Kirby, 1886 has been reported in Australia, Borneo, India, Malaysia, Korea, Taiwan, and Thailand and encompasses four described species (Heraty 2002; Heraty et al. 2015). Among these, *Saccharissa vicina* (Masi, 1926) was originally described from Taiwan and has since been recorded from Korea (Park et al. 2023). However, our knowledge of the genus'distribution and biology remains limited. In Japan, 10 eucharitid species representing seven genera have been recorded (Matsuo 2020; Hisasue 2020). Although *Saccharissa* has been documented in neighboring countries, it has not yet been recorded in Japan, suggesting that the diversity of Eucharitidae in Japan may be underestimated.

While examining specimens deposited in museum collections, an unidentified species of *Saccharissa* previously unrecorded in Japan has been observed. After careful examination of these Japanese specimens, they were identified as *Saccharissa vicina*. Japanese individuals showed a close morphological match with the Taiwanese lectotype, except for forewing length. However, in India, Malaysia, Thailand, and Vietnam, morphologically distinct individuals that could be considered separate species have been identified as *S. vicina* (Heraty 2002). Therefore, it is necessary to document the geographical variation among populations from different regions to advance the taxonomic re-evaluation of this species.

In this study, the genus *Saccharissa* has been reported from Japan for the first time based on *S. vicina* and described the morphological differences between the Japanese population and those from other regions.

METHODS

The dried specimens used in this study were deposited in the collections of the following institutes: the Entomological Laboratory of Kyushu University, Fukuoka, Japan (ELKU), Ehime University Museum, Japan (EUMJ), Osaka Museum of Natural History, Osaka, Japan (OMNH) and Iriomote Station, Tropical Biosphere Research Center, University of the Ryukyus (UR-TBRCI).

OPEN ACCESS

Academic editor: Avunjikkattu Parambil Ranjith
Received: 8 February 2025
Accepted: 17 March 2025
Published: 20 March 2025

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Photographs were captured using an MP-E65 mm microlens mounted on a Sony 7R IV digital camera, combined using Zerene Stacker (Zerene Systems LLC), and processed in Photoshop CC (Adobe). The distribution map was produced using SimpleMappr (Shorthouse 2010).

The morphological terms mainly followed those of Heraty et al. (2018) and Baker and Heraty (2020).

The forewing length of *S. vicina*, a total of 19 specimens was measured from Taiwan ($n = 4$), Yaeyama Islands ($n = 10$) and Tsushima Island ($n = 5$). A figure was visualized using R v. 4.4.3 (R Core Team 2024) and RStudio v. 2024.12.1 (R Foundation).

RESULTS

Saccharissa Kirby, 1886

Identification. *Saccharissa* is distinguished from other eucharitid genera by the following characteristics: antenna with 13–15 flagellomeres. Flagellomeres serrate or pectinate in females, and pectinate in males. flagellomere II is simple, serrate or branched, and always shorter than flagellomere III. The apex of the scutellum is produced into a single truncate, emarginate or weakly forked horn. The frenal groove is lacking, but in some species the lateral margin of the scutellum is inflected below the midline, and the axillular groove even with the lateral margin of the process. Additional characters include having the posterolateral corners of the mesoscutum expanded over the tegula, scutellum longitudinally carinate, hind femur swollen in the apical half, and the stigmal vein long, prominent and perpendicular to the anterior margin. Coloration of body black or black with faint metallic blue or green reflection (Heraty 2002; present study). The recorded specimens matched these diagnostic characteristics and were identified as *Saccharissa* without uncertainty.

Saccharissa vicina (Masi, 1926)

Figures 1, 2

New records. JAPAN — **Tsushima Island** • Nagasaki Pref., Tsushima-shi, Mitsushima-cho, Sumo; 26.VIII.2022; Keiichi Otsui leg.; 1 ♂, ELKU • Nagasaki Pref., Mt. Ariake, 21.VIII.1966; S. Nomoto leg.; 1♂, EUMJ • Nagasaki Pref., Izuhara; 25.VIII.1966; S. Nomoto leg.; 1 ♂, EUMJ • Nagasaki Pref., Izuhara, Sasutoge; 24.VIII.1941; Takashi Shirozu leg.; 1 ♂1 ♀, ELKU — **Ryukyu Islands** • Okinawa Pref., Ishigaki-jima Isl., Nagura; 24.XI.1960; Keizo Yasumatsu leg.; 2♂, ELKU • Okinawa Pref., Ishigaki-jima Isl., Mt. Buzama-dake; 26.X.2014; Ryosuke Okano leg.; 3♂, EUMJ • Okinawa Pref., Ishigaki-jima Isl., Ishigaki-shi, Ohama; 8.VIII.2017; Ryudai Ito leg.; 1 ♂, OMNH • Okinawa Pref., Ishigaki-jima Isl., Ishigaki-shi, Ohama; 9.VIII.2017; Ryudai Ito leg.; 1♂, OMNH • Okinawa Pref., Ishigaki-jima Isl., Ishigaki-shi, Ohama (24°25′04.8″N, 124°11′56.4″E), alt. 50 m; 19.X.2022; Ryudai Ito leg.; 2♂, OMNH • Okinawa Pref., Ishigaki-jima Isl., Ishigaki-shi, Ishigaki, Mt. Maese-dake (24°22′15.6″N, 124°09′03.6″E), alt. 120 m; 18.X.2022; Ryudai Ito leg.; 3♂, OMNH • Okinawa Pref., Ishigaki-jima Isl., Ishigaki-shi, Mt. Maese-dake

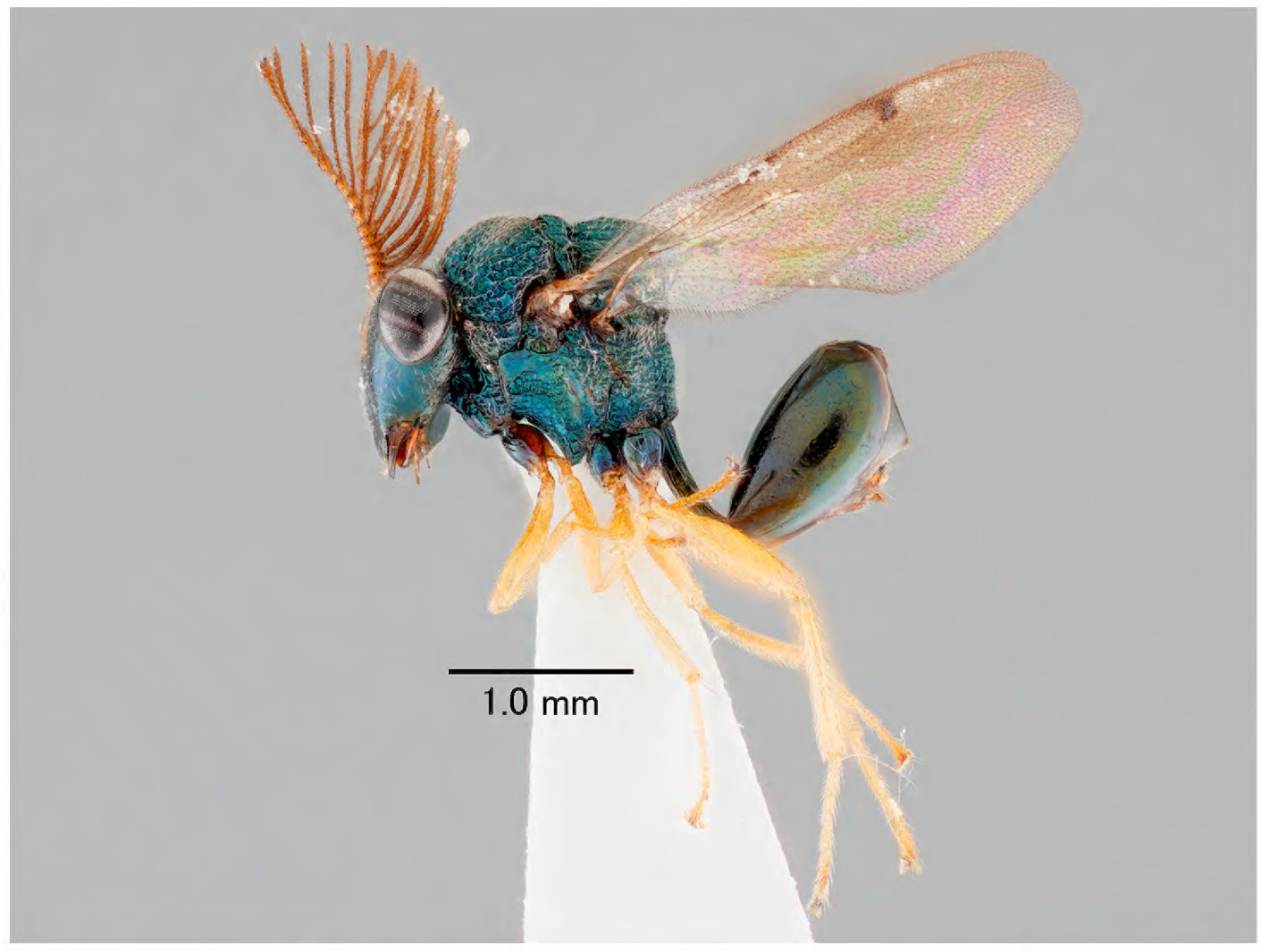

Figure 1. Male of *Saccharissa vicina* from Japan.

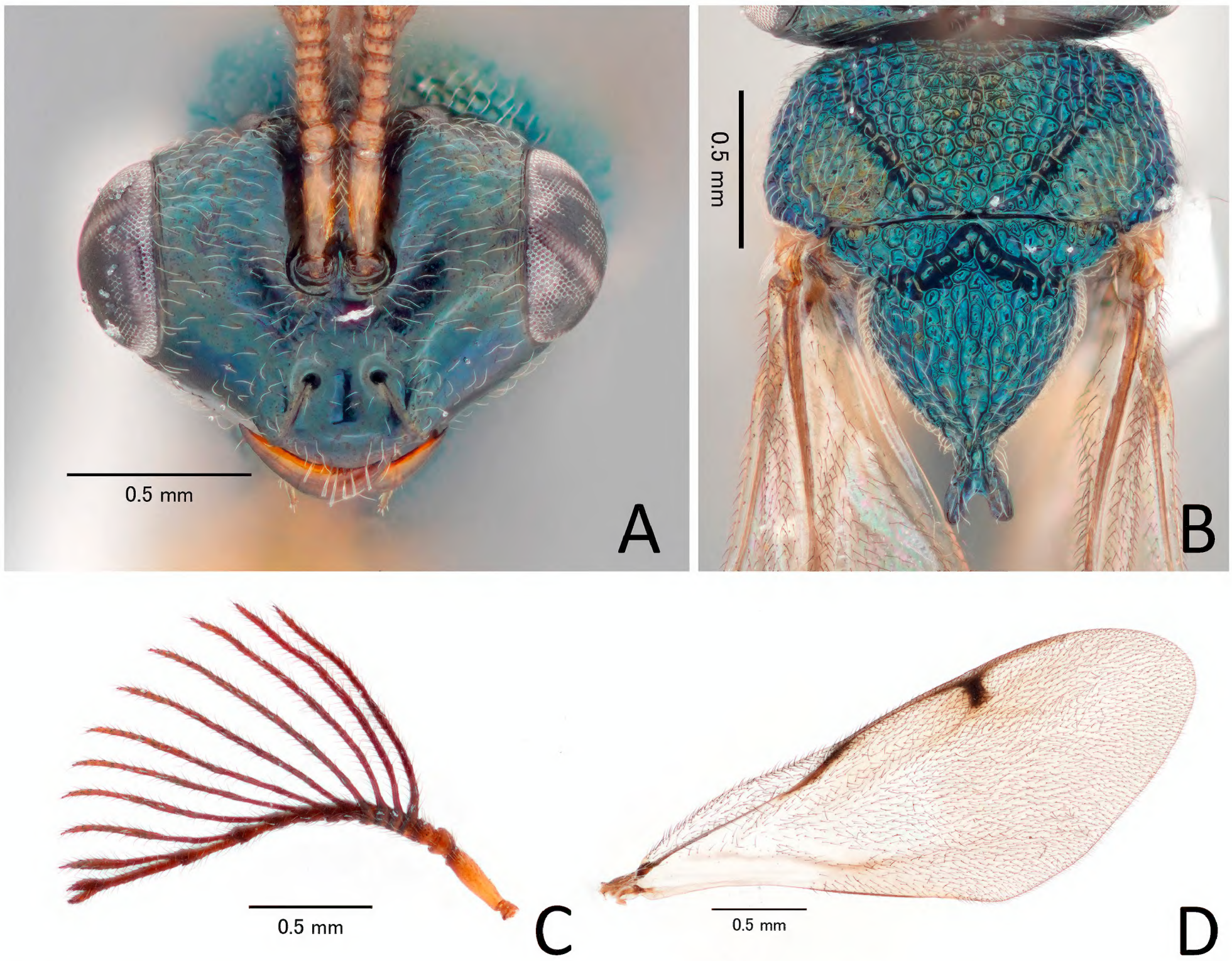

Figure 2. Head and mesosoma of *Saccharissa vicina* (male) from Japan. **A.** Frontal view of head. **B.** Dorsal view of Mesosoma. **C.** Antenna, dorsal view. **D.** Fore wing.

(24°22'12.0"N, 124°08'52.8"E), alt. 170 m; 20.X.2022; 3♂, OMNH • Okinawa Pref., Ishigaki-jima Isl., Ishigaki-shi, Shiraho, Riverbed of Toro River, 28–29.V.2021; Shunsuke Imada & Naomichi Tsuji leg.; 1♀, ELKU • Okinawa Pref., Iriomote-jima Isl., Taketomi-cho, Komi, 3.VIII.2017, Ryudai Ito leg. 2♂, OMNH • Okinawa Pref., Iriomote-jima Isl., Taketomi-cho, Funaura, 5.VIII.2023, Nakatada Wachi leg. 2♂, UR-TBRCI • Okinawa Pref., Iriomote-jima Isl., Taketomi-cho, Funaura, 8.XI.2023, Nakatada Wachi leg. 1♂, UR-TBRCI.

TAIWAN — **Nantou Hsien** • Pingtung Township, Kenting Park; 24.VI.1970; Yoshihiro Hori leg.; 2♂, EUMJ • Pingtung Township, Mudan, Mudan Park (22°10'N, 120°50'E); 27.X.2017; Juriya Okayasu leg.; 2♂, EUMJ • Pingtung Country, Mudan Township, Mt. Gaoshifo-shan (22°07'51.4"N, 120°48'36.8"E), alt. 463 m; 31 III 2019; Kazushige Uemori leg.; 1♂, ELKU.

Identification. *Saccharissa vicina* is distinguished from other species in the following characteristics: the antenna with 13 flagellomeres; basal flagellomere of both sexes cylindrical; flagellomeres except for basal segment serrate in females, and pectinate in males; mesoscutum rugose-areolate; dorsum with sparse erect hairs; scutellar projection less than twice as long as apical width, if long then distinctly forked apically, projection equal to less than the scutellar disc; stigmal vein almost perpendicular relative to anterior wing margin. Coloration: body black with faint metallic green reflections; scape, pedicel, and flagellomeres brown; mandibles and tegula blackish brown; trochanter, femur, tibia, and tarsomeres pale yellow.

Barring a difference in body length, the Japanese specimens examined here agree with the holotype, descriptions, and diagnosis of *S. vicina* based on the information from available literature on their morphological characteristics (Masi 1926; Heraty 2002). Accordingly, these Japanese specimens are identified as *S. vicina*.

Specimens of *Saccharissa vicina* from Ishigaki-jima Island and Iriomote-jima Island exhibited variations in the development of the scutellar projection, ranging from sharply pointed tips to distinctly bifurcated structures. An examination of the relationship between the forewing lengths of *S. vicina* across regions

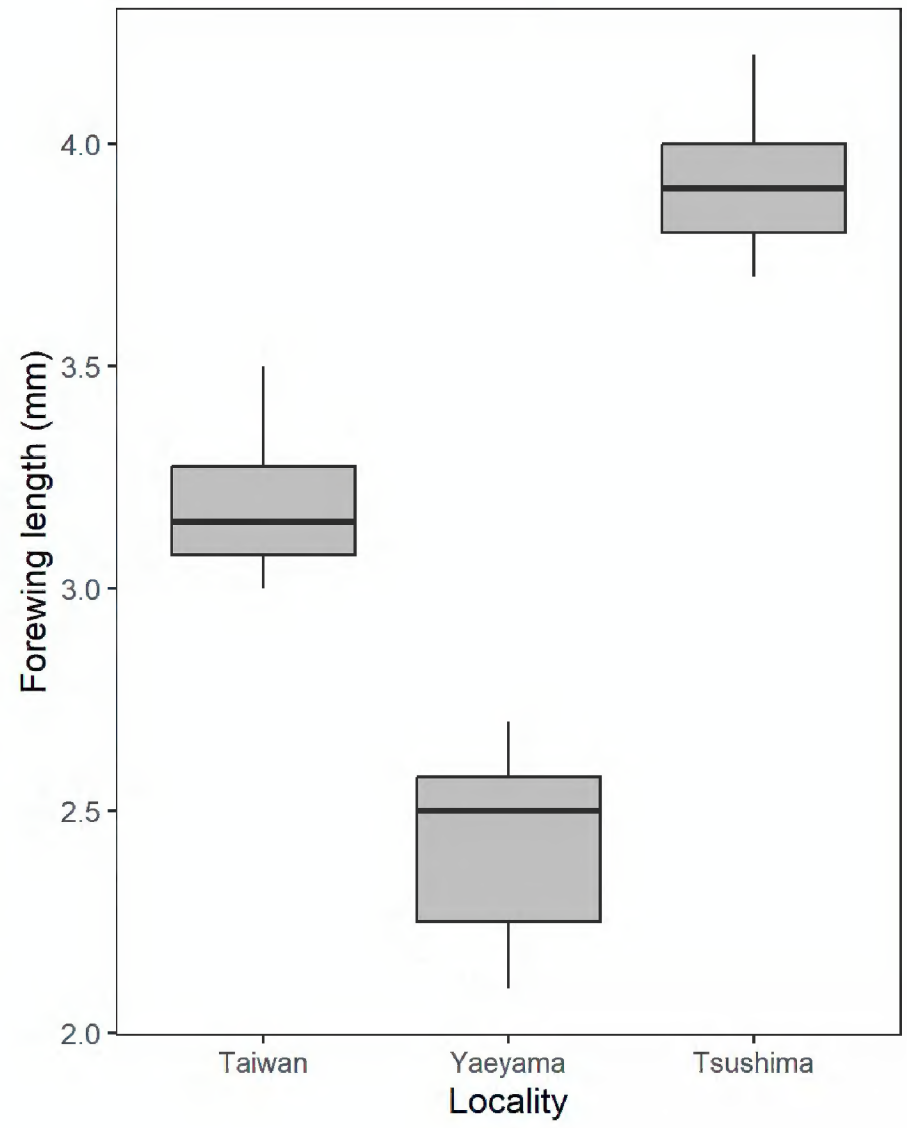

Figure 3. Relationships of forewing length and localities of *Saccharissa vicina*. The x-axis shows each locality, Taiwan ($n = 4$), Yaeyama ($n = 10$), and Tsushima ($n = 5$). The line in the middle of the boxplot represents the median value, and the bottom and top of the box represent the 25th and 75th percentiles of the data.

(Figure 3) reveal that individuals from Tsushima are significantly larger than those from Ishigaki-jima Island and Iriomote-jima Island, in the Yaeyama Islands, and slightly larger than those from Taiwan.

Distribution. Japan (Tsushima Island, Ishigaki-jima Island, Iriomote-jima Island) (present study); South Korea (Park et al. 2023); Taiwan (Masi 1926; Heraty 2002) (Figure 4).

Biology. Females and males visited leaves of *Alocasia atropurpurea* Engl. on Ishigaki-jima Island, while males visited that of *Alocasia odora* (Lodd.) Spach on Iriomote-jima Island.

DISCUSSION

The Yaeyama Islands and Tsushima, where *Saccharissa vicina* has been recorded in Japan, are known for the high diversity of subtropical organisms (Shirozu 1976; Araya 2016). This study identified *S. vicina* specimens obtained from Tsushima Island and the Yaeyama Islands as the same species as the Taiwan lectotype based on their matching morphological characteristics. However, the Korean specimens reported by Park et al. (2023) exhibited differences in antennal coloration from both the lectotype and Japanese specimens. Similar morphologies have been observed in specimens from Taiwan, Tsushima Island, and Yaeyama Islands, regions known to share a common biota owing to the dispersal effects of the Kuroshio current and Tsushima Island currents and climatic factors (Nakanishi 1996). The specimens examined by Park et al. (2023) were collected from northern Korea, a region with a climate distinct from these areas, suggesting that the differences in coloration and distribution warrant further investigation. Specimens identified as *S. vicina* have also been reported from Southeast Asia. However, the Taiwanese specimens may represent a different species, signaling the need for further taxonomic reassessment (Heraty 2002).

Moreover, comparisons with specimens from Japan showed that individuals from Tsushima Island were larger than those from Yaeyama Islands and Taiwan (Figure 3). Variations in body size within this species are thought to be linked to differences in host ant species across populations (Heraty 2002), suggesting that the observed bimodal body size in Japanese populations may reflect differences in the host ants found in each region. Additional ecological observations of host and larval development are needed to determine whether these variations arise from nutritional conditions during development or from interspecific differences. Furthermore, comparative analyses incorporating morphological and molecular data are crucial to resolving these issues.

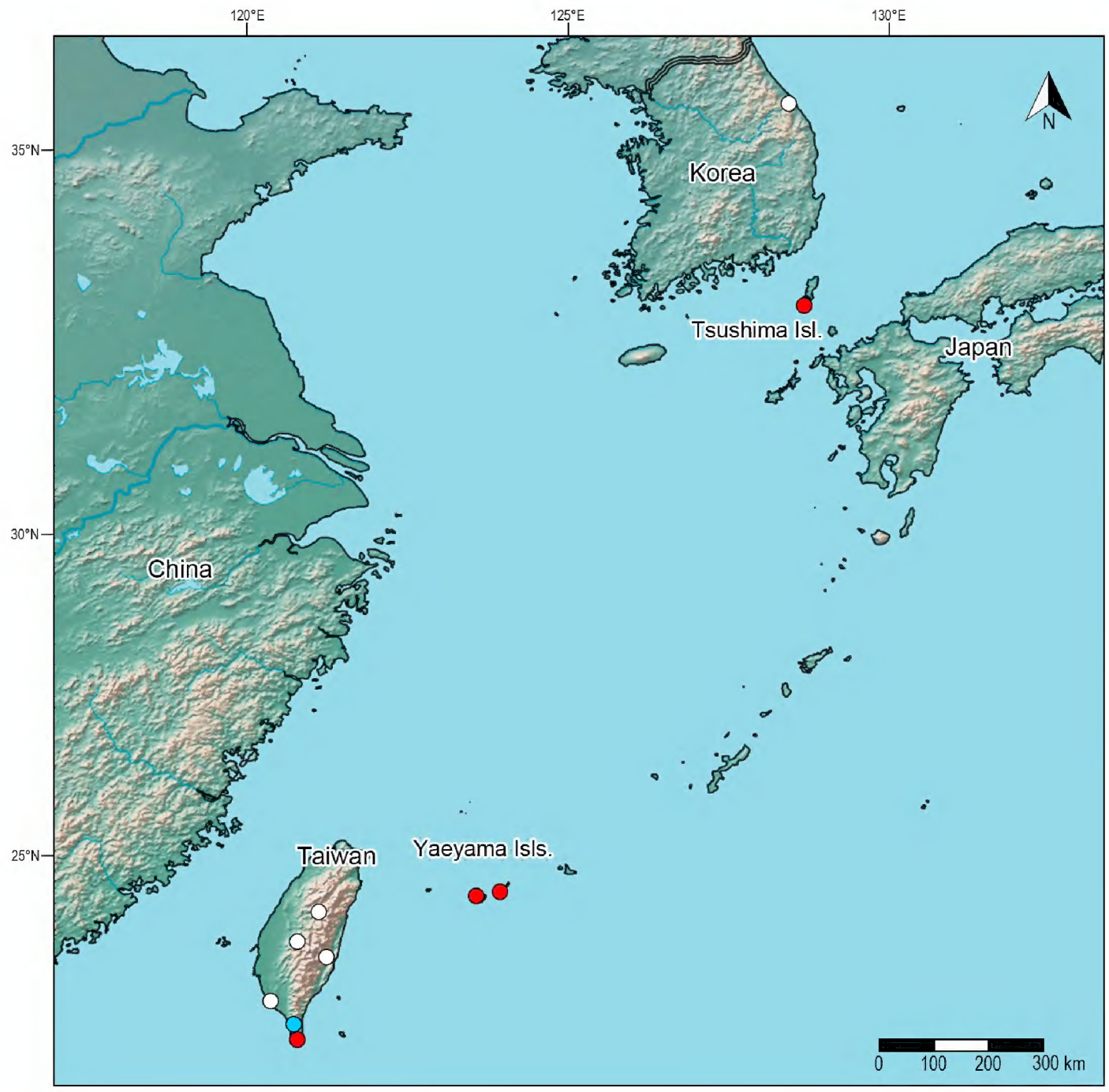

Figure 4. Distribution map of *Saccharissa vicina*. Type locality (Blue circle). Additional localities in the previous studies (white circles). Additional localities in the present study (red circles).

ACKNOWLEDGEMENTS

I would like to express my cordial thanks to Dr. J. Souma (Shirakami Research Center for Environmental Sciences, Faculty of Agriculture and Life Science, Hirosaki University, Aomori, Japan), and two reviewers for their suggestions and comments on this manuscript. I would also like to thank Mr. R. Ito (OMNH), Dr. S. Imada (Lake Biwa Museum, Shiga, Japan), Mr. K. Otsui (Kyushu Branch Office, Wesco Co., Ltd., Fukuoka, Japan), Dr. N. Tsuji (Ogasawara Division of Japan Wildlife Research Center, Tokyo, Japan), Dr. K. Uemori (Forestry and Forest Products Research Institute, Ibaraki, Japan), and Dr. N. Wachi (UR-TBRCI) for their help with field materials, Mr. S. Fujie (OMNH), Dr. T. Mita (ELKU) and Dr. H. Yoshitomi (EUMJ) for help with examining museum collections. I also thank Editage (www.editage.com) for the English-language editing.

ADDITIONAL INFORMATION

Conflict of interest

The author declares that no competing interests exist.

Ethical statement

No ethical statement is reported.

Funding

This study received no special funding.

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Data availability

All data that support the findings of this study are available in the main text.

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